Smart Networks Project

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Outline

- Goals
- Approach
- Illustration
- Complementary Work
- Future Work

Goals

QoS over Ad Hoc Networks

- Suitable for Large Networks
- EF + BE Traffic
- Multiple Access Channels
- Handles Mobility: Changing Topology
- Local Optimization
- Implementation

Approach

- Scalable QoS Routing Algorithm
  - Clustering
  - Intra-Domain QoS Routing → Domain Summary
  - Inter-Domain QoS Routing
  - On-Line Algorithm
- Protection of QoS
  - Traffic Shaping of BE Traffic
  - Protocol for Distributing LB Parameters
- Adapt to Topology Change
  - Fast Recomputation
- Local Optimization
  - Batch Path Allocation when Needed

Illustration

- Mobile Nodes
- Requests for QoS-Connections
- QoS Routing
  - Clustering
  - Local Optimization after Changes

Illustration: Nodes with Connectivity

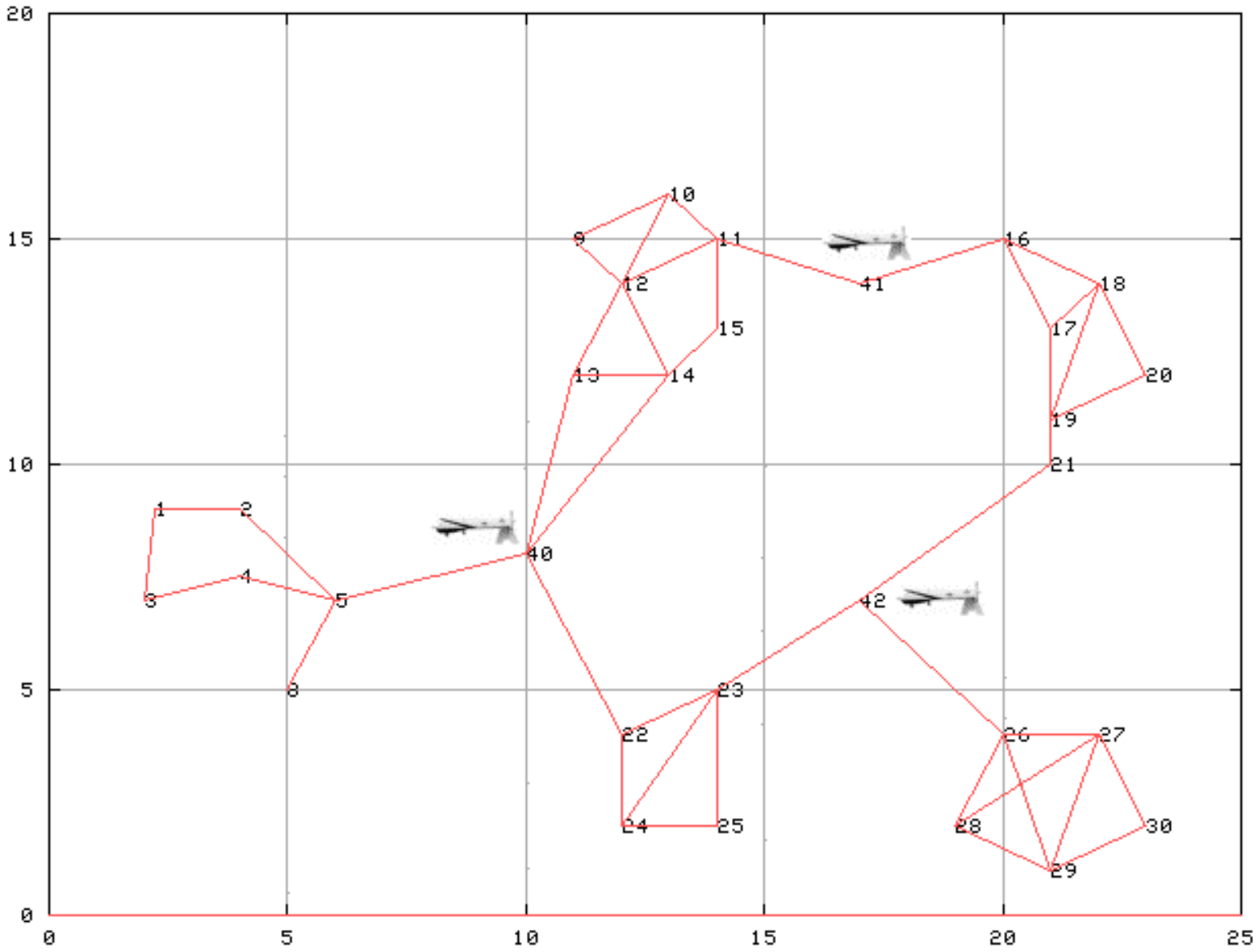


Illustration: Clustering

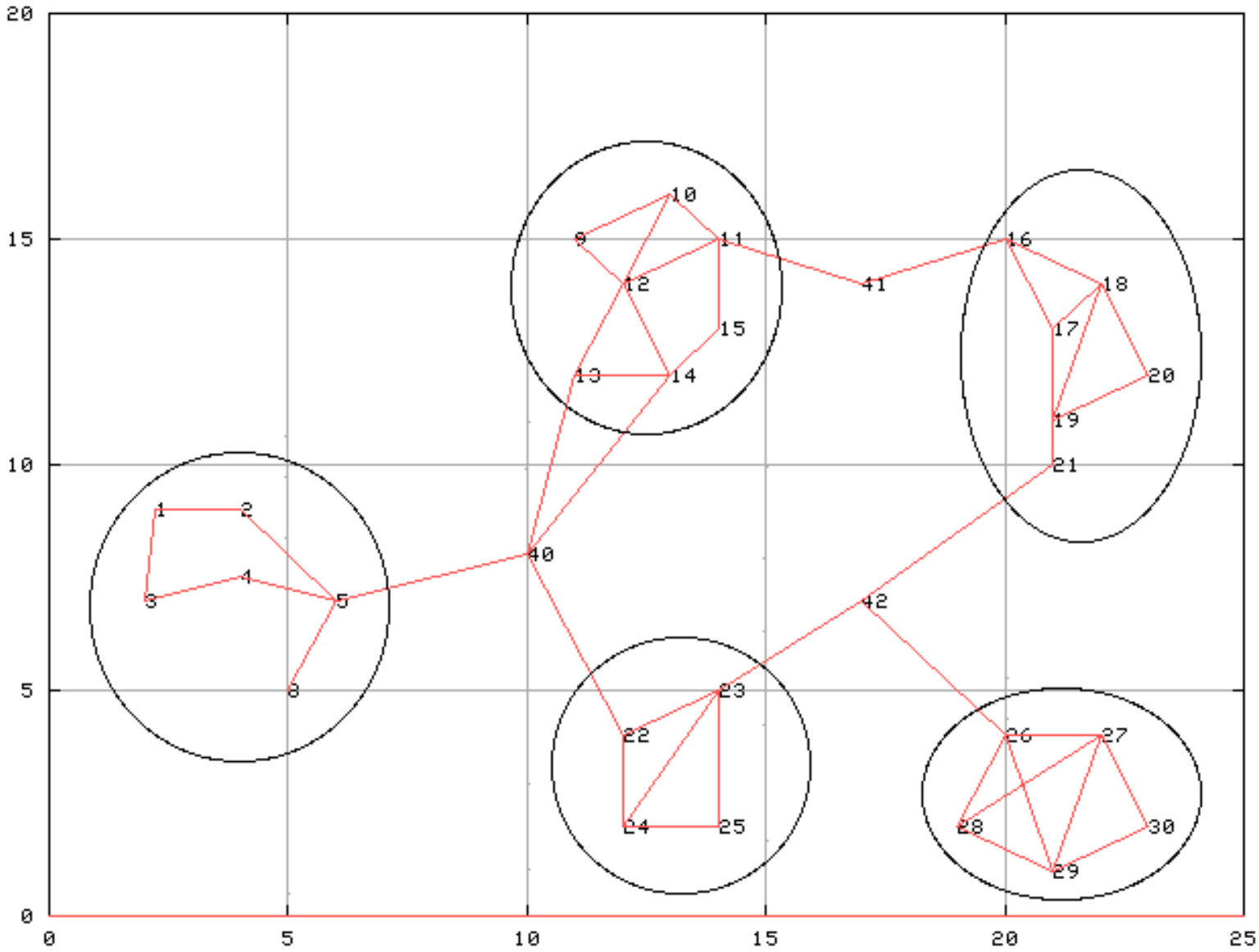


Illustration: Cluster Summaries

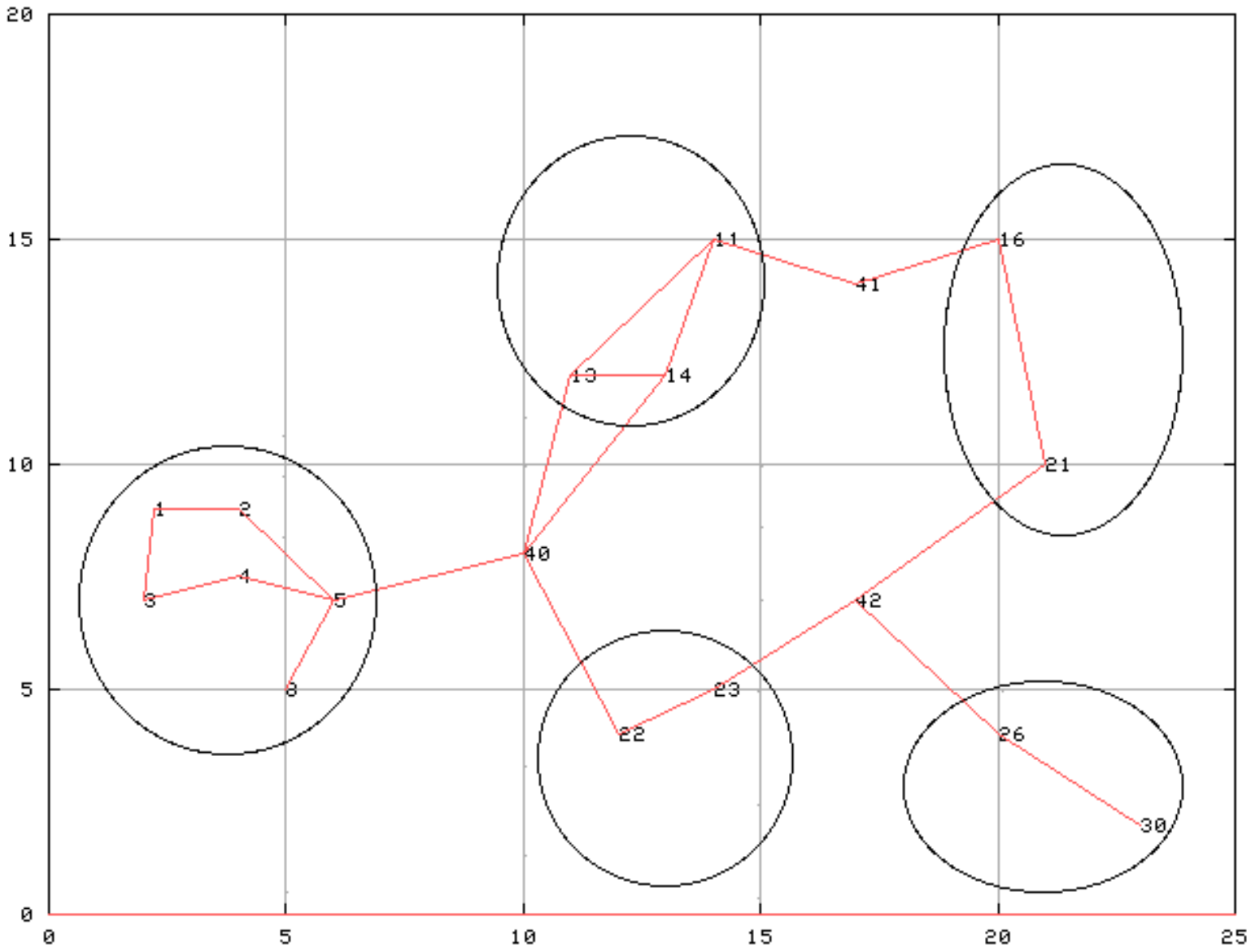


Illustration: On-Line QoS Routing

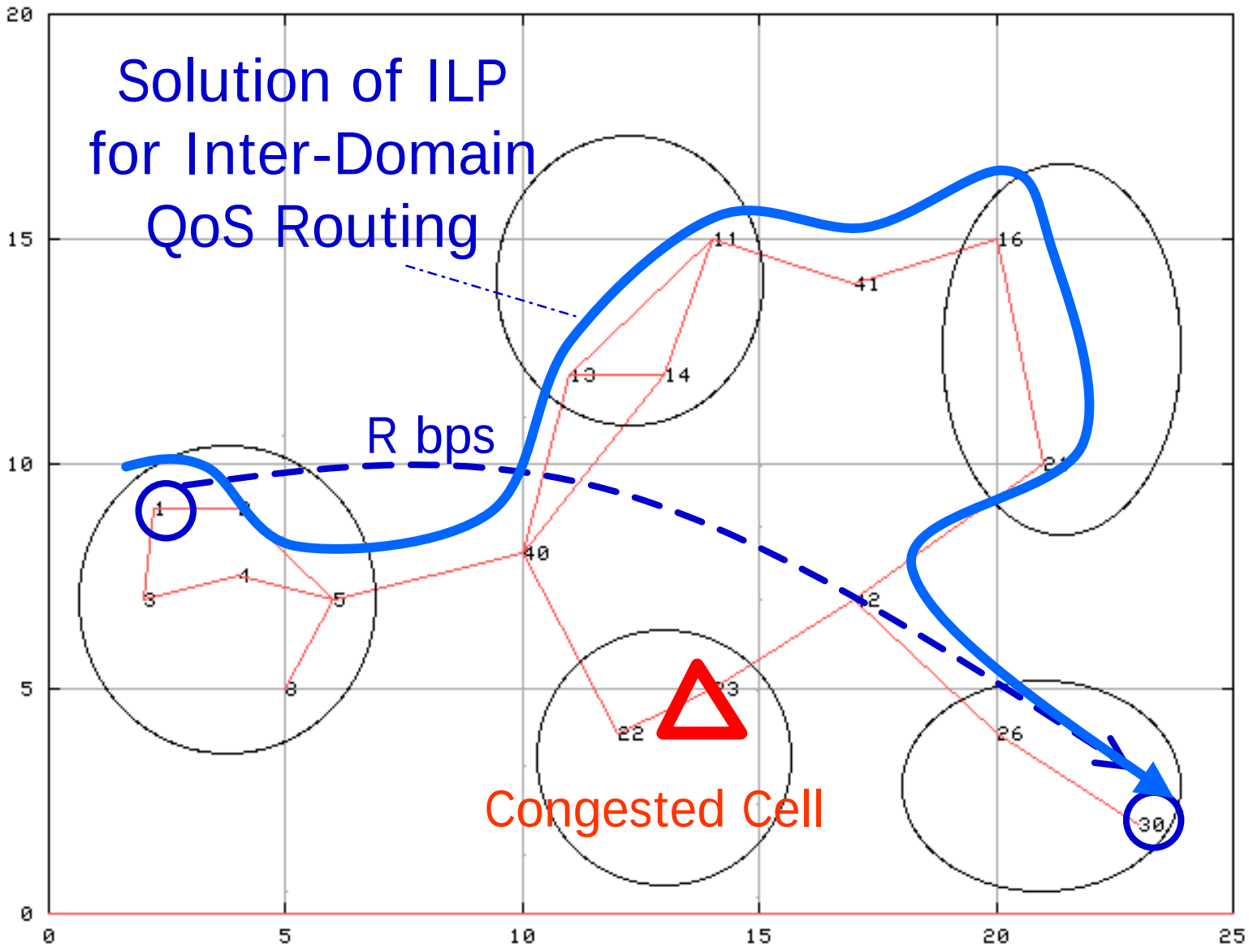


Illustration: Intra-Domain QoS Routing

Solve QoS Routing between gateways

Note: Multiple Access

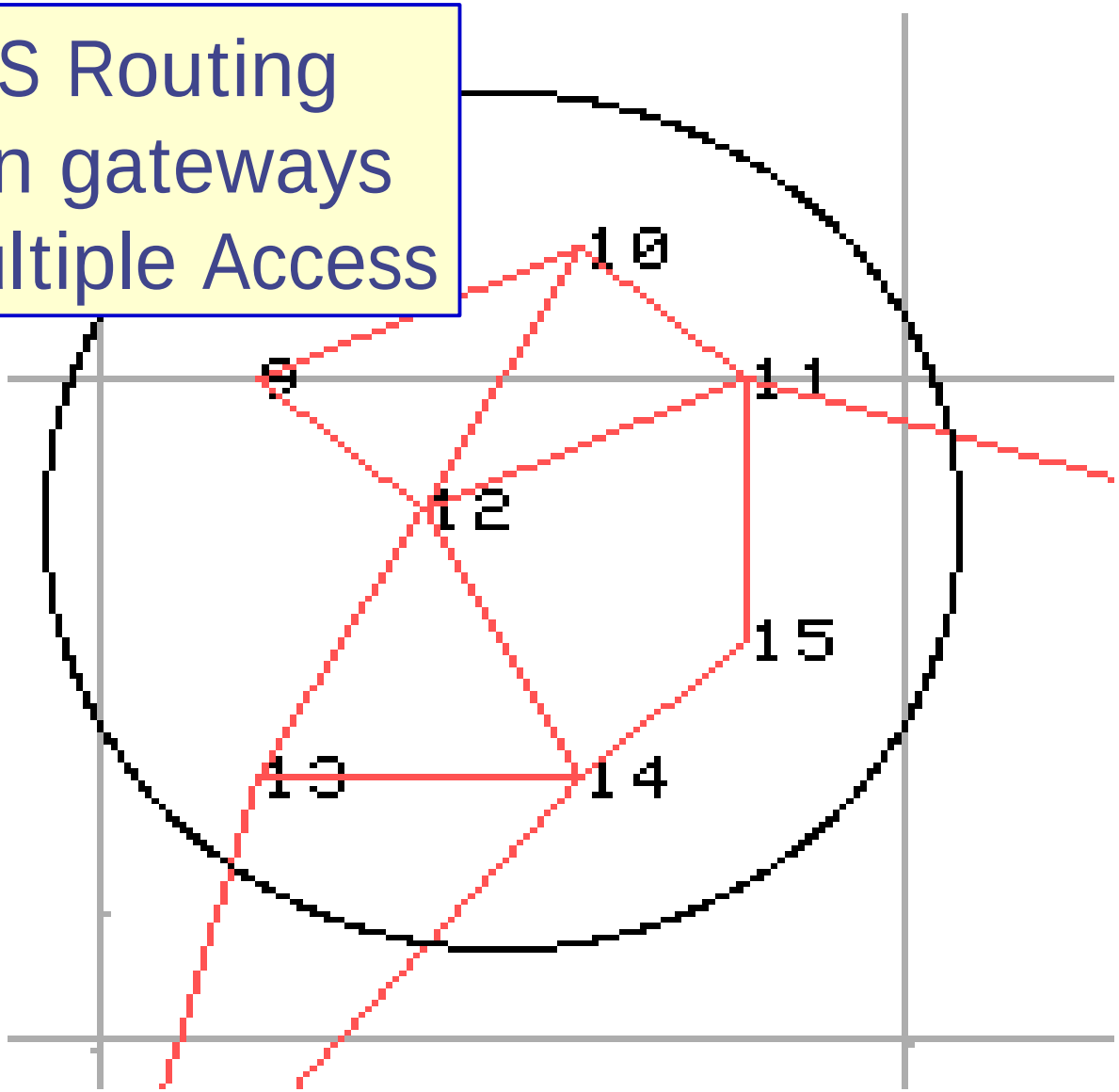
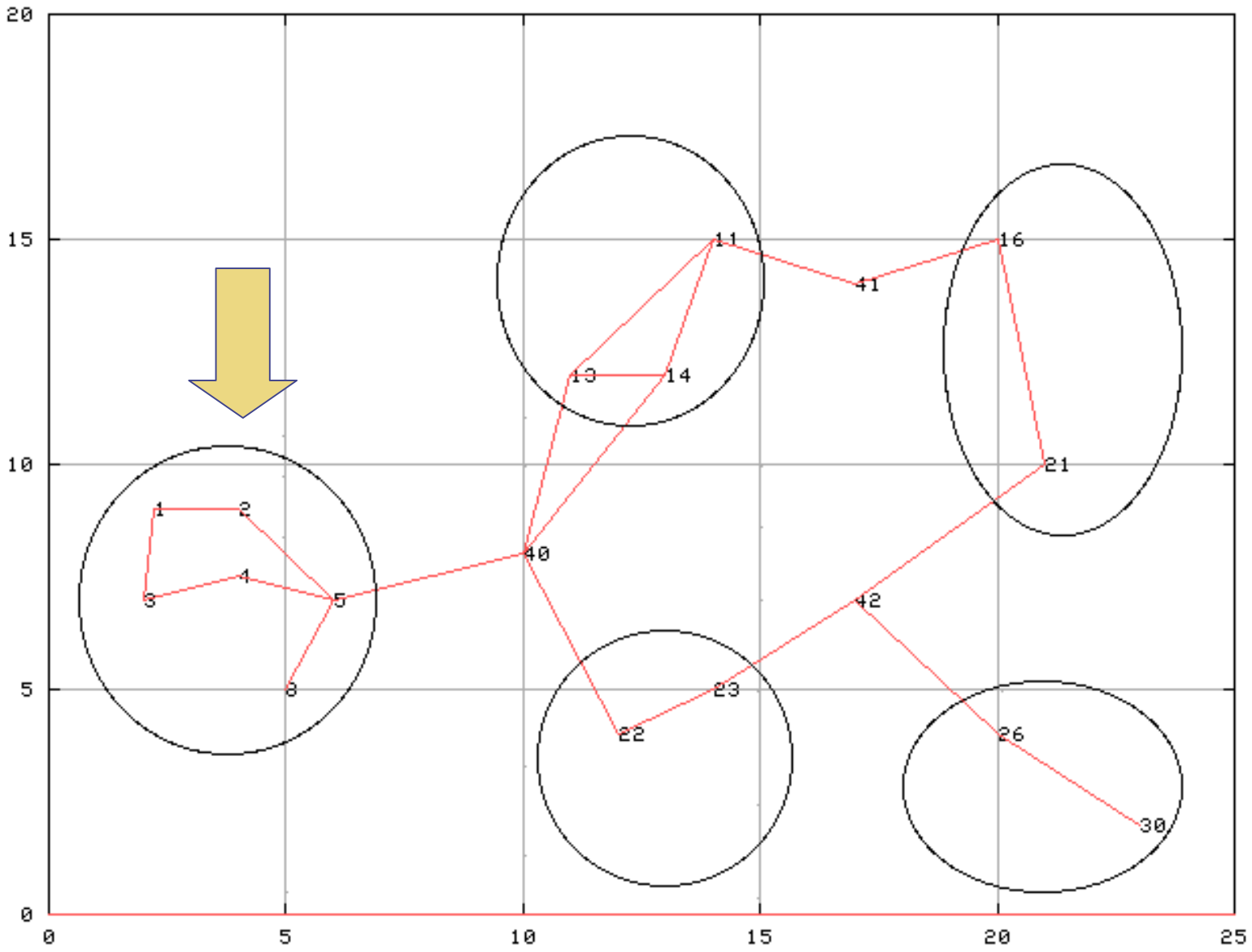


Illustration: Intra-Domain Optimization



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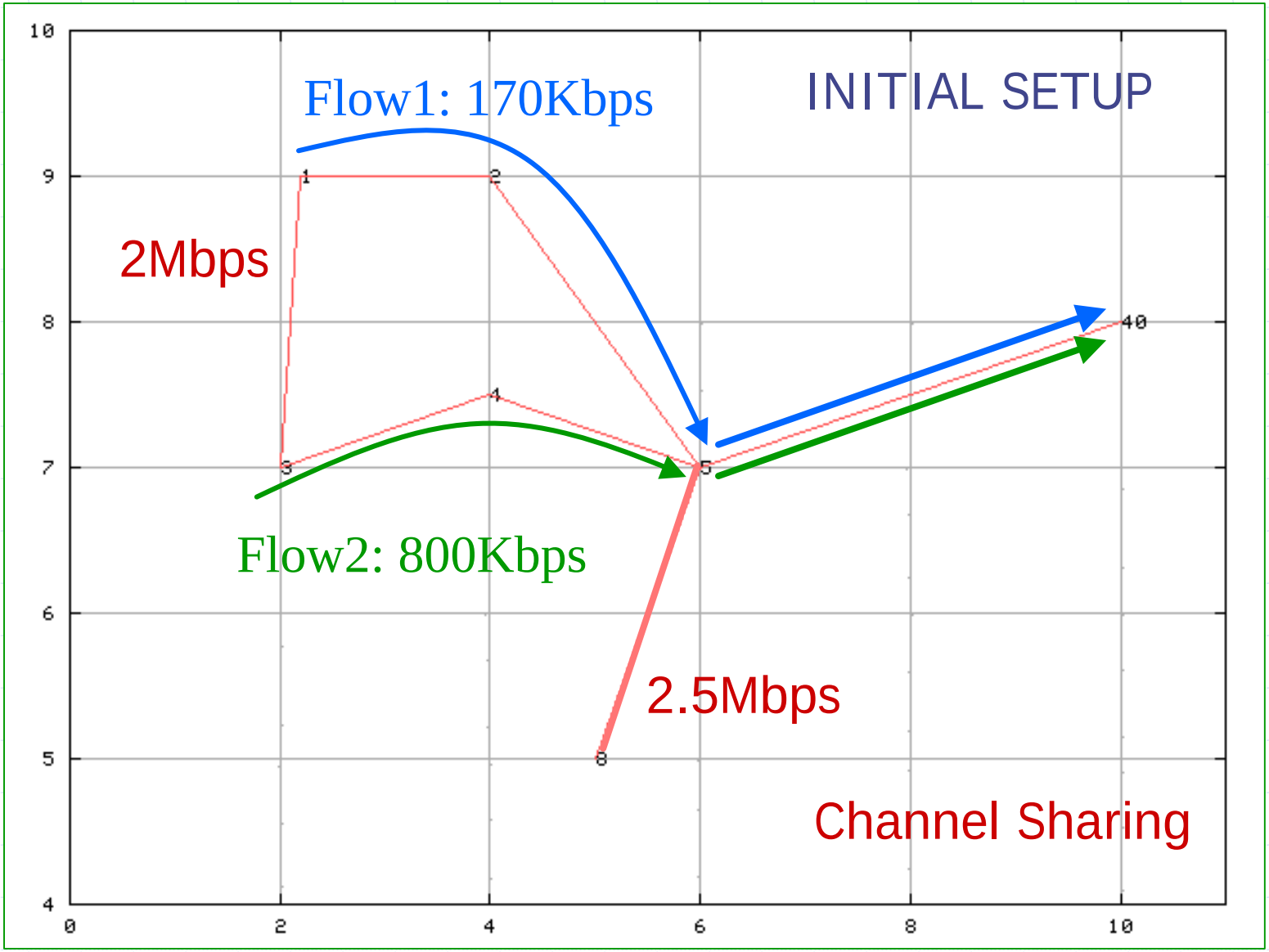

Illustration: Intra-Domain Optimization

MOTION:

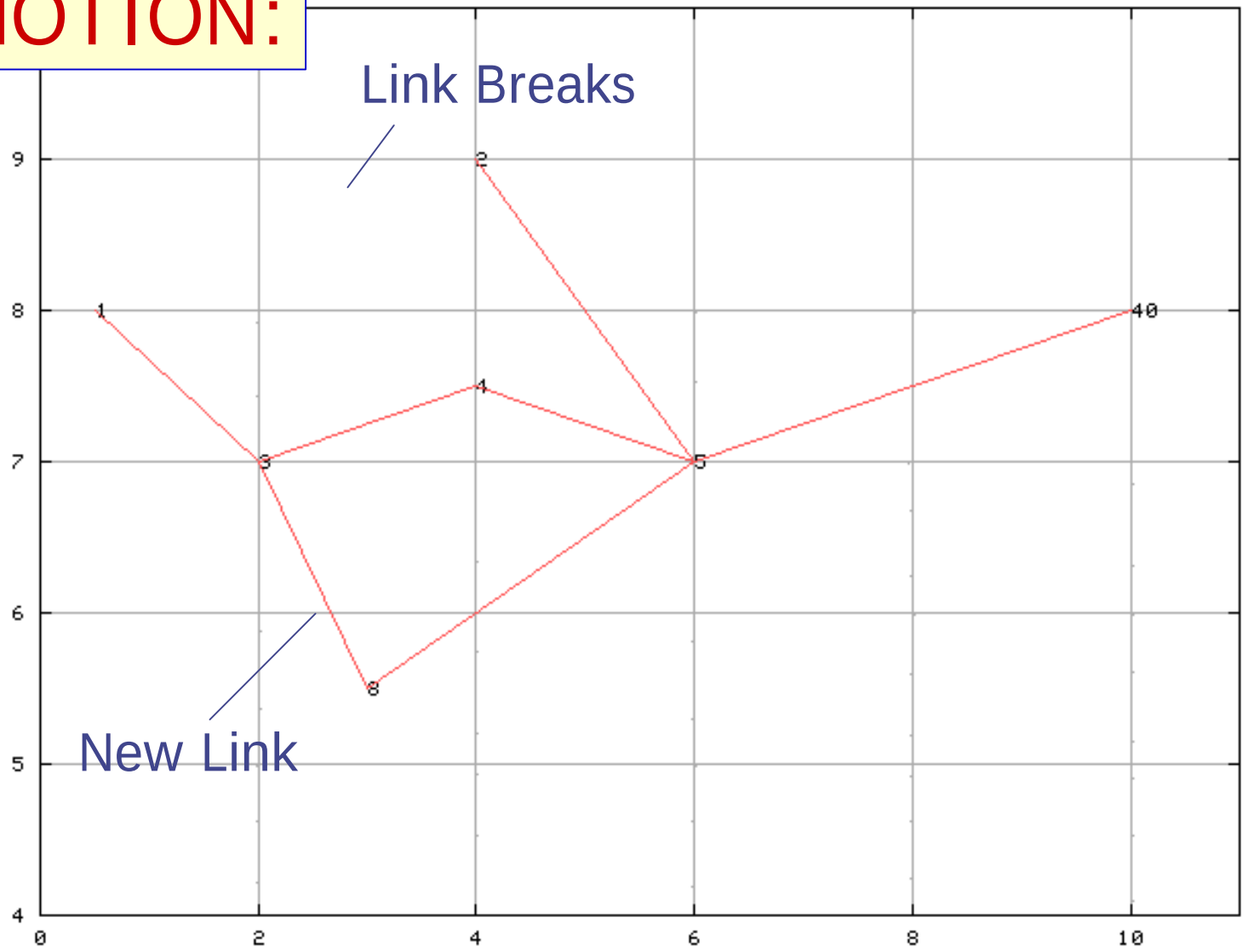

Illustration: Intra-Domain Optimization

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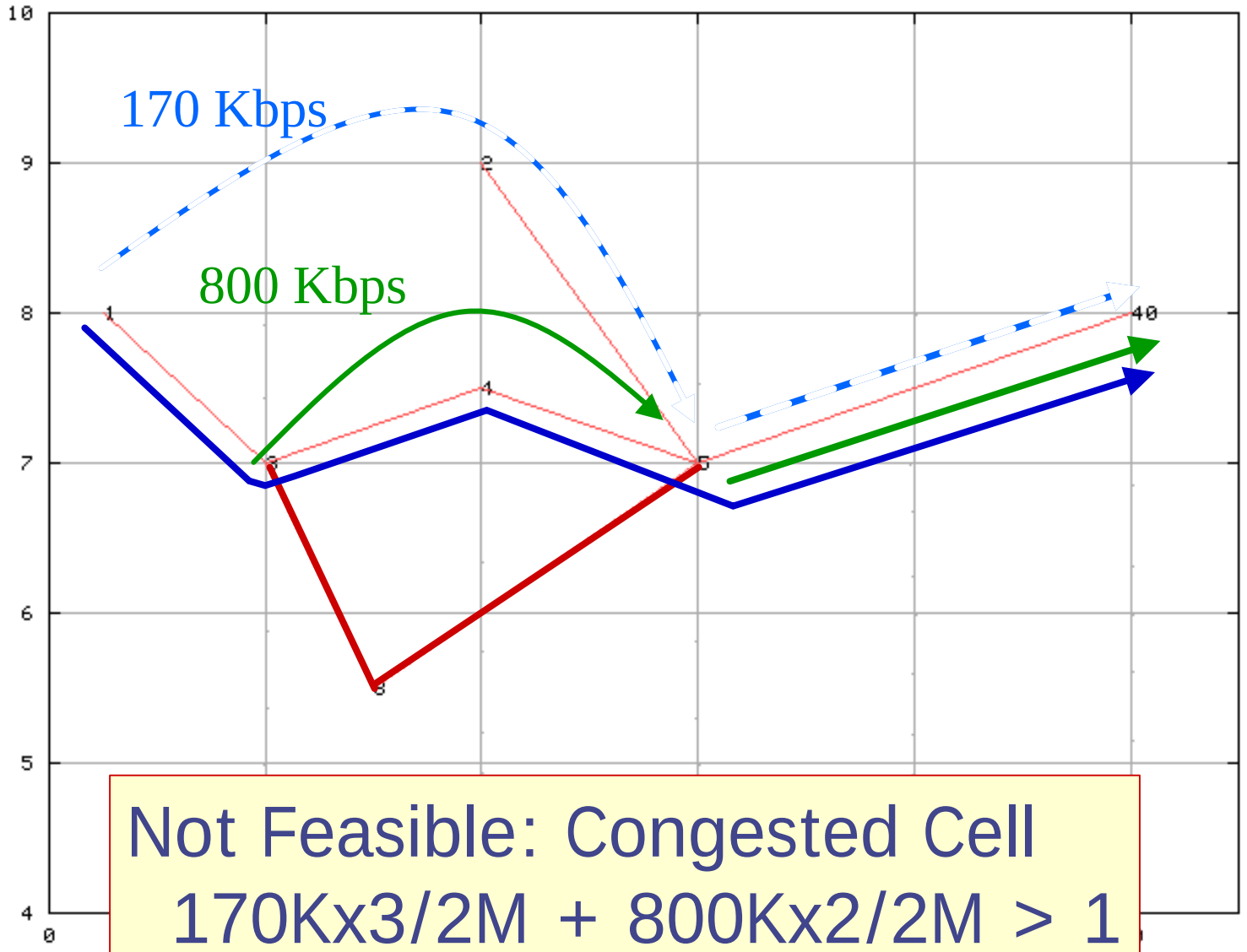
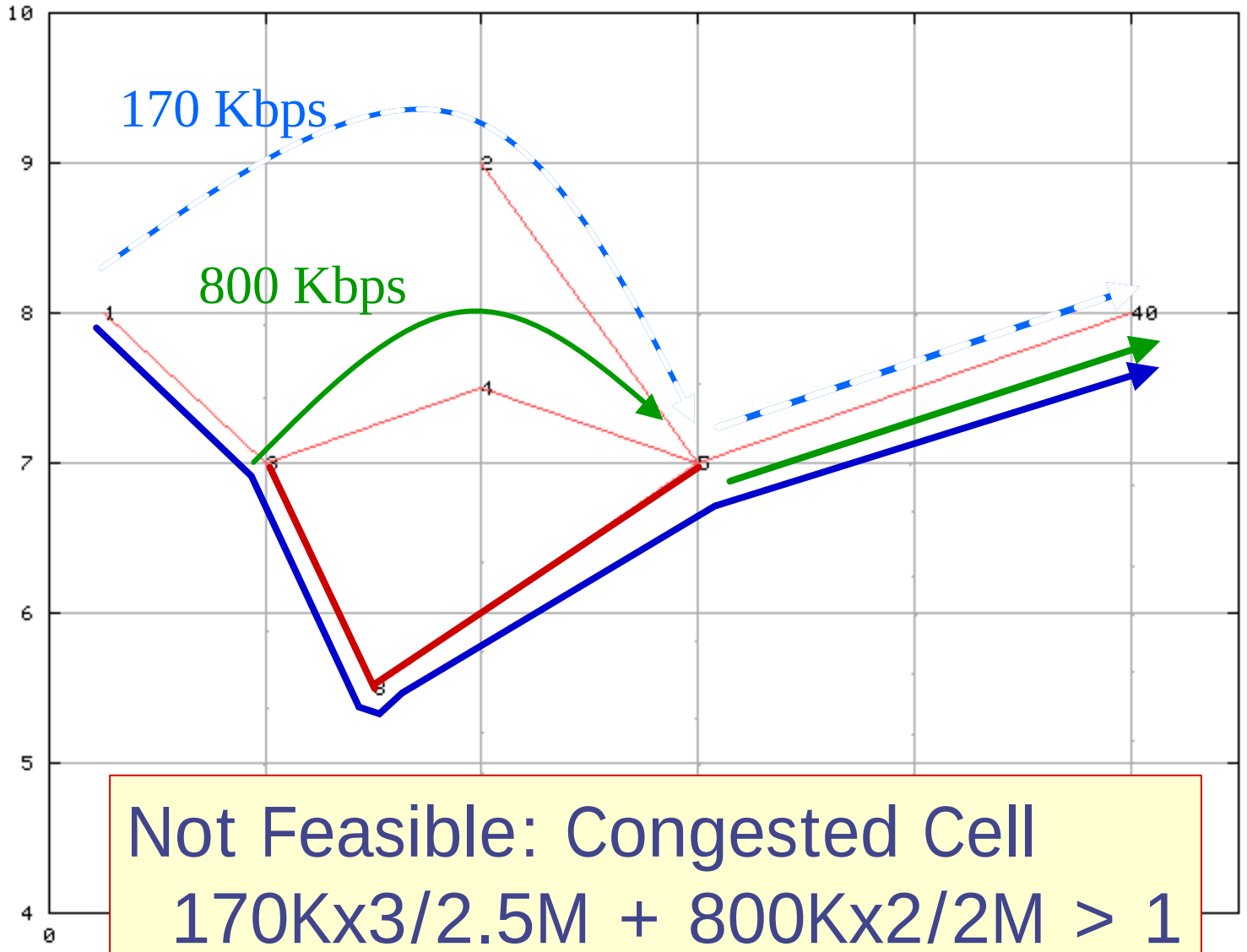


Not Feasible: Congested Cell

170Kx3/2M + 800Kx2/2M > 1

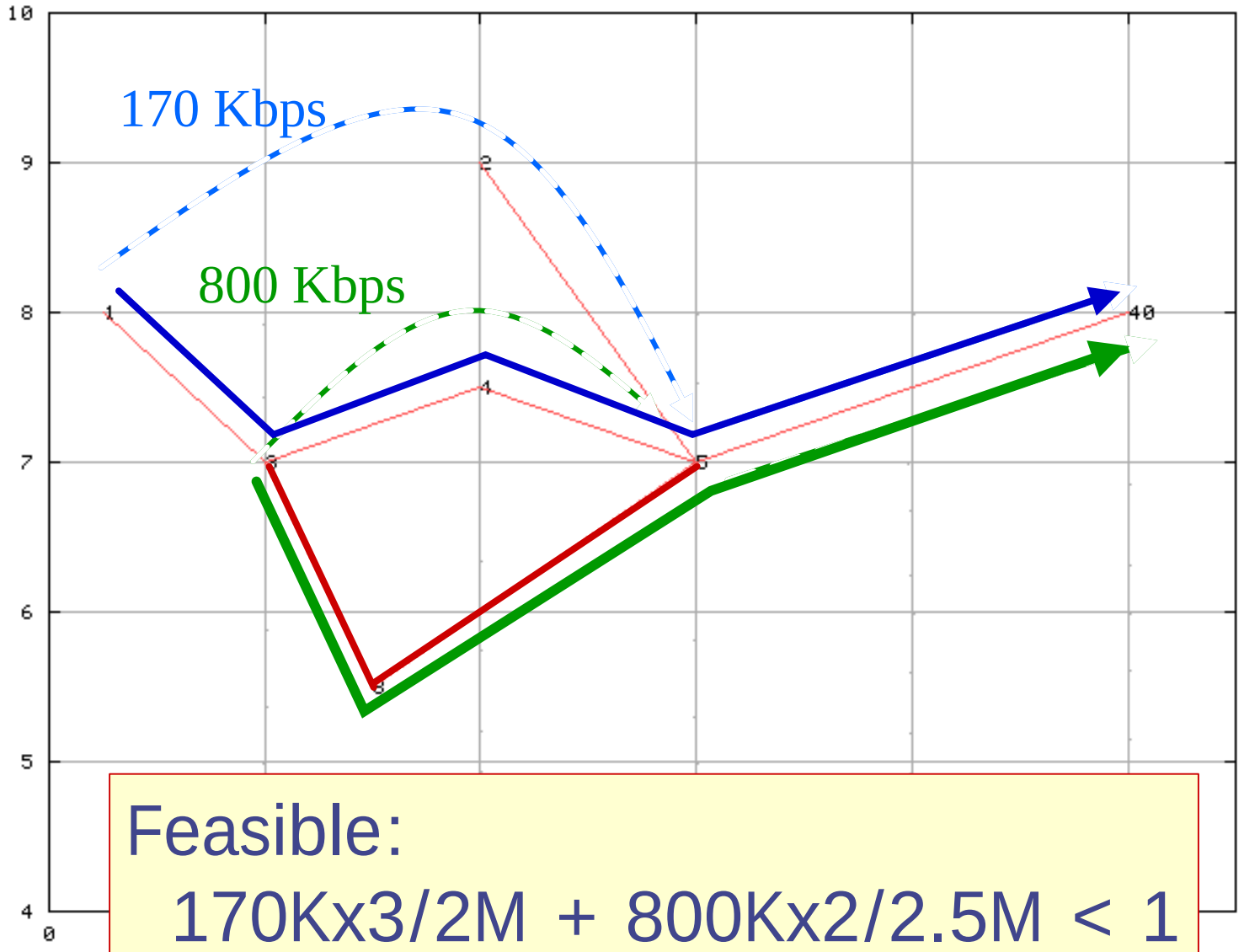
Illustration: Intra-Domain Optimization



Not Feasible: Congested Cell

170Kx3/2.5M + 800Kx2/2M > 1

Illustration: Intra-Domain Optimization



Feasible:

170Kx3/2M + 800Kx2/2.5M < 1

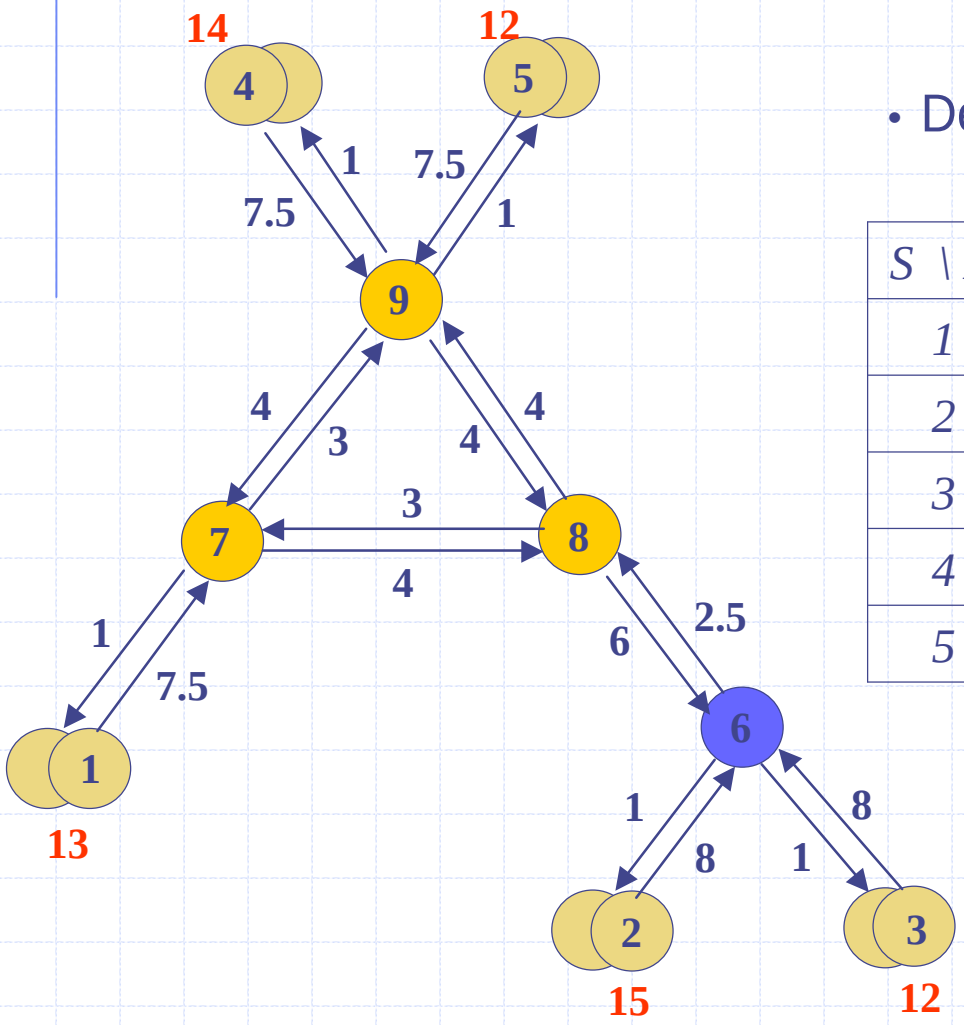
Complementary Work:

- SLA Provisioning
- End-to-End Call Admission

Complementary Work: SLA Provisioning

- Goal: Distributed Algorithm for SLAs
- Application: MPLS ...

Complementary Work: SLA Provisioning



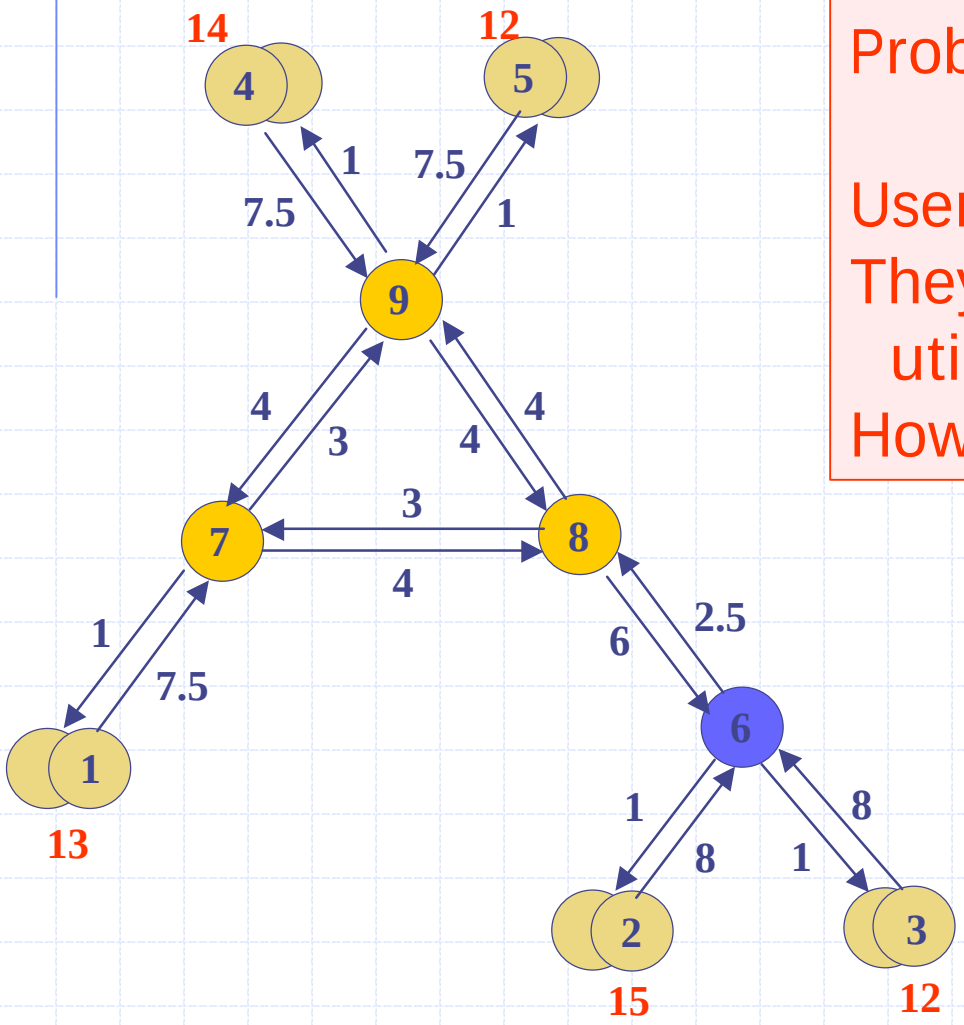
- Shortest-path routing based on hop-count
- Demand:

S \ D	*1*	*2*	*3*	*4*	*5*
1		*10*	*10*	*10*	*10*
2	*20*		*5*	*15*	*10*
3	*10*	*15*		*5*	*20*
4	*10*	*25*	*20*		*5*
5	*5*	*15*	*20*	*10*	

Price/Mbps

Utility / Mbps

Complementary Work: SLA Provisioning



Problem:

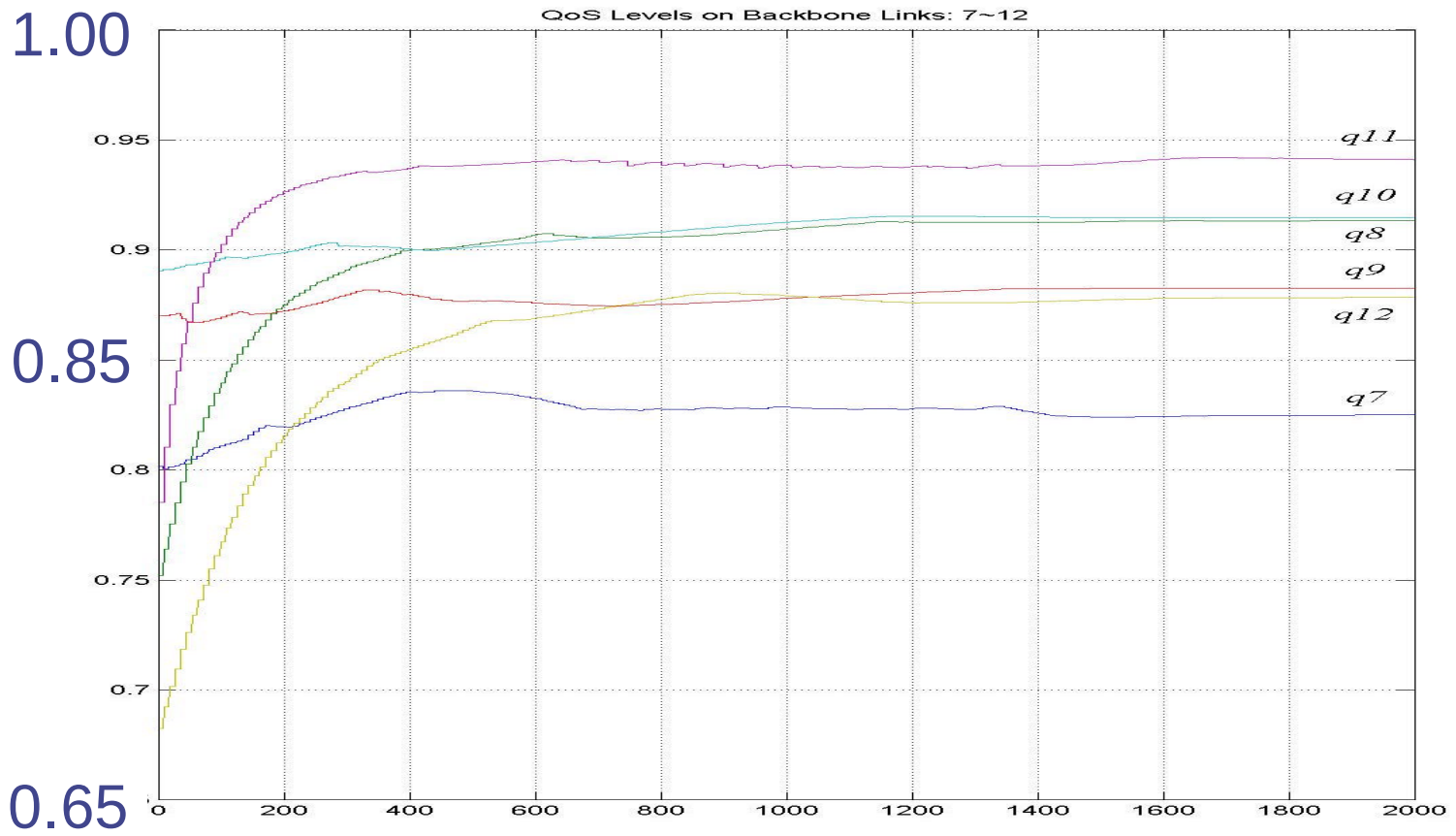
Users and ISPs are selfish
They want to maximize their utilities
How to select SLAs?

Solution:

Game where players adjust the offered QoS

Complementary Work: SLA Provisioning

backbone links



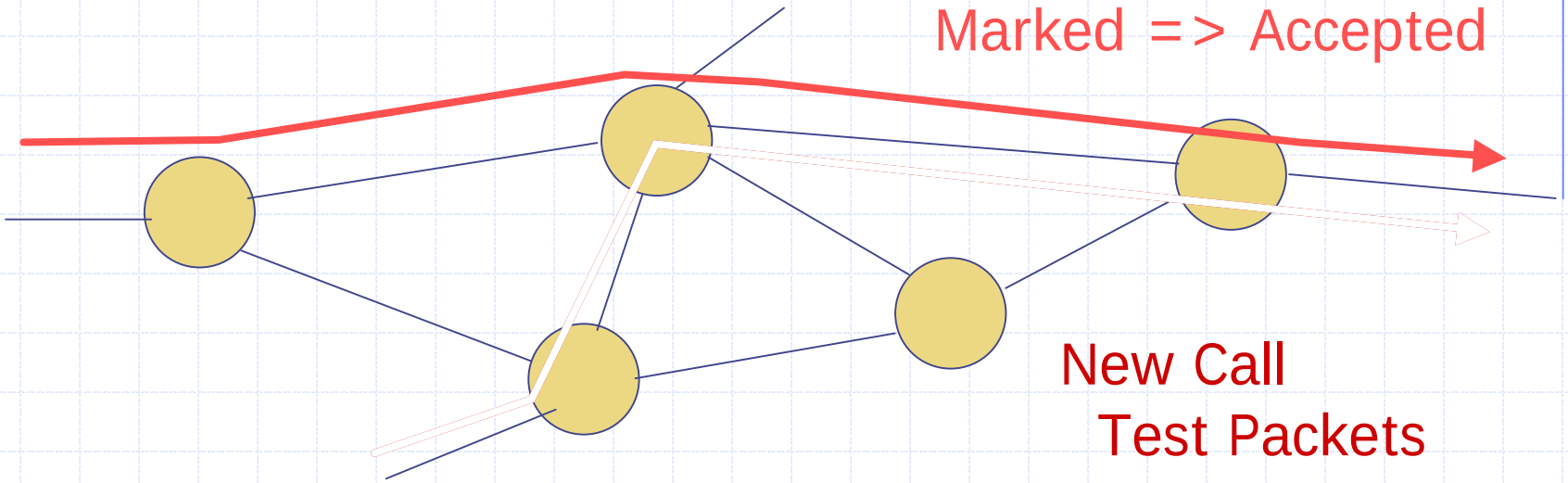
Complementary Work: End-to-End QoS

- Goal: End-to-End CAC of VoIP
- Implementation by AQM

Complementary Work: End-to-End QoS

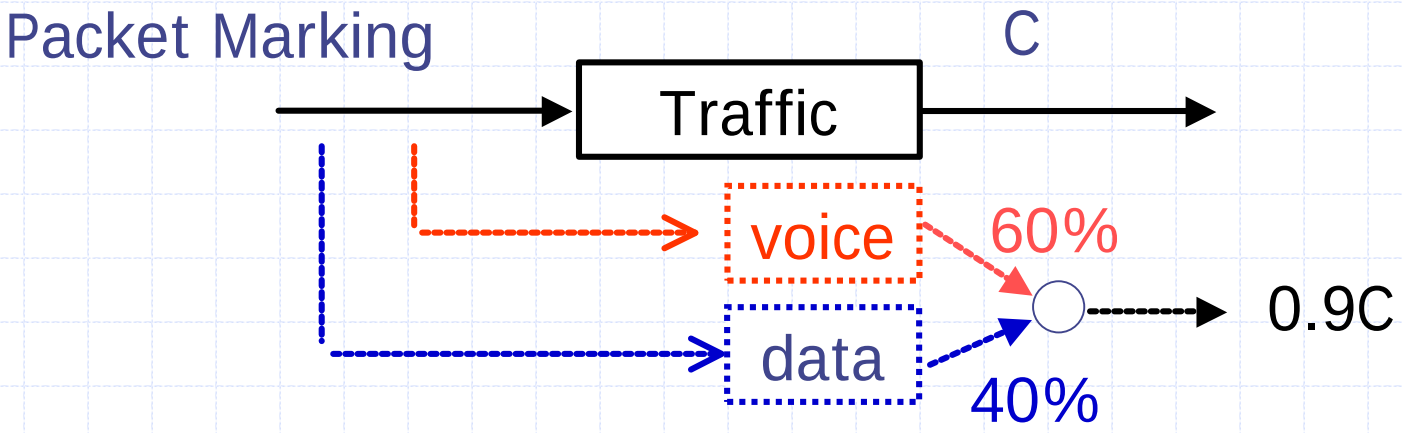
New VoIP Call

Test Packets Not Marked => Accepted



New Call

Test Packets Marked => Drop



Future Work

- Faster Dynamic Routing
  - Precomputation
  - Local Rerouting
- Increase Efficiency
  - Improved Summary Algorithm
- Improve Mobility Support
  - Dynamic Clustering
  - Dynamic Channel Allocation